

WHAT IS CLAIMED IS:

1. A rotary encoder, comprising:

a substrate having a front center hole, a back surface, an outermost periphery, first and second ring-shaped electrode patterns formed on the surface concentrically around the center hole, and a ring-shaped comb electrode pattern without a difference in level formed adjacent an outermost periphery, wiring patterns covering the electrode patterns through each of three external connecting terminals provided on the outermost periphery on the front surface or back surface of said substrate;

a case having an open end, edges adjacent said open end and a circular hole formed in a center of an upper surface thereof, said case being secured to the substrate at the edges of the open case;

a shaft rotatively inserted through the circular hole of said case, so as to be supported thereby, a lower end shaft portion of said shaft further being rotatively inserted into the center hole of said substrate;

a gear-shaped rotor supported by a bottom surface of said shaft in said case, said rotor having an outer periphery, being rotated simultaneously with and by said shaft;

a click mechanism capable of elastically displacing a ball bearing subject to elastic pressure exerted by a plate spring provided in said case into a concave portion on the outer periphery of said rotor, so as to regulate a rotating angle of said shaft; and

a first slider, affixed to a lower surface of said rotor, for electrically connecting the first ring-shaped electrode pattern and the ring-shaped comb electrode pattern, and a second slider for electrically connecting the second ring-shaped electrode pattern and the ring-shaped comb electrode pattern, said first slider and said second slider outputting pulse signals with different phases.

2. The rotary encoder according to claim 1, further comprising:

a switch board having a circular conductor pattern on a center of its surface, a horseshoe conductor pattern around the circular conductor pattern and two switch terminals wired on the conductor patterns, respectively, provided on a bottom surface of said substrate of said encoder; and

a dome type conductor having repulsiveness placed on the conductor patterns on the surface of said switch board;

wherein said shaft is energized to a shaft direction by a spring provided on a bottom surface of said shaft and simultaneously supported to said substrate of said encoder so as to be slidable up and down, and said shaft has a tact switch mechanism for electrically connecting the switch terminals in such a manner that said shaft is pressured in the shaft direction and thus its lower end shaft portion deforms a center portion of the dome conductor on said switch board.

3. A method of manufacturing the substrate of the rotary encoder according to claim 1, comprising:

an etching step comprising etching a resin substrate, in which metal foil is bonded to its front surface and back surface so as to form the first and second ring-shaped electrode patterns provided concentrically around the center hole and the ring-shaped comb electrode pattern on the outermost periphery as electrode patterns;

a plating step comprising metal-plating the three electrode patterns of said resin substrate;

a resin varnish applying step comprising applying and surprinting resin varnish into a concave portion of the ring-shaped comb electrode pattern after the etching, so as to remove excessive resin varnish from the surface;

a resin varnish curing step comprising heating and compressing said resin substrate so as to cure the resin varnish surprinted into the concave portion; and

a polishing step comprising polishing and removing the excessive varnish remaining on the metal surfaces of the electrode patterns so as to flatten the surfaces of the electrode patterns.

4. A method of manufacturing the substrate of the rotary encoder according to claim 2, comprising:

an etching step comprising etching a resin substrate, in which metal foil is bonded to its front surface and back surface so as to form the first and second ring-shaped electrode patterns provided concentrically around the center hole and

the ring-shaped comb electrode pattern on the outermost periphery as electrode patterns;

a plating step comprising metal-plating the three electrode patterns of said resin substrate;

a resin varnish applying step comprising applying and surprinting resin varnish into a concave portion of the ring-shaped comb electrode pattern after the etching, so as to remove excessive resin varnish from the surface;

a resin varnish curing step comprising heating and compressing said resin substrate so as to cure the resin varnish surprinted into the concave portion; and

a polishing step comprising polishing and removing the excessive varnish remaining on the metal surfaces of the electrode patterns so as to flatten the surfaces of the electrode patterns.